Course Code: 1950203 Roll No: **MLRS- R19**

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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III B.Tech I Sem Supply End Examination, August 2022

Control Systems

(ECE)

Time: 3 Hours. **Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A

(10*2 Marks = 20 Marks)

1. a)	What are the basic elements used for modelling mechanical translational system?	2M	CO1	L1
b)	Define transfer function.	2M	CO1	L1
c)	List out the limitations of R-H criterion.	2M	CO2	L1
d)	State marginal stability.	2M	CO2	L1
e)	Draw a polar plot and explain.	2M	CO3	L2
f)	Write the expression for resonant peak.	2M	CO3	L2
g)	Discuss PID controller.	2M	CO4	L1
h)	Explain about lag compensator.	2M	CO4	L1
i)	Give merits and demerits of state variable techniques.	2M	CO5	L2
j)	Show that the eigen values are invariant under a linear transformation.	2M	CO5	L2

PART- B

(10*5 Marks = 50 Marks)

2	Describe the effect of feedback on Gain, Stability, Noise and Sensitivity of a closed loop control system.	10M	CO1	L2

OR

3	Determine the transfer function C/R for the block diagram given in Fig.1.	10M	CO1	L3

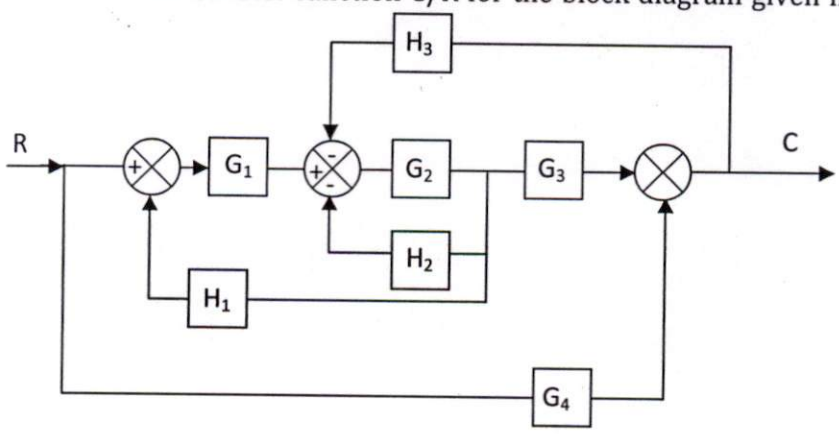

Fig.1

4	a)	Derive the expression for time domain specification of a under damped second order system to a step input.	5M	CO2	L2
	b)	How steady state error of a control system is determined? How it can be reduced?	5M	CO2	L2
		OR			
5		Sketch the root locus for the system given by $G(s)H(s)=\frac{K}{s(s+2)(s^2+2s+2)}$. Determine the value of "k" at imaginary axis crossing point. Give the steps followed for construction of Root locus.	10M	CO2	L4
6	a)	Write short notes on various frequency domain specifications.	5M	CO3	L3
	b)	Explain about the steps followed for the construction of Bode plot.	5M	CO3	L3
		OR			
7		A system is given by $G(s)=\frac{4s+1}{s^2(s+1)(2s+1)}$ Sketch the Nyquist plot & hence determine the stability of the system.	10M	CO3	L4
8	a)	Illustrate the procedure followed to construct a root locus using root locus technique.	5M	CO4	L3
	b)	Obtain the transfer function for lead compensator and draw pole-zero.	5M	CO4	L3
		OR			
9		What are the different types of controllers that are used in closed loop control systems? Explain in detail.	10M	CO4	L4
10	a)	Convert the following system matrix to canonical form: $\begin{bmatrix} 1 & 2 & 1 \\ -1 & 0 & 2 \\ 1 & 3 & -1 \end{bmatrix}$	5M	CO5	L4
	b)	Enumerate state model and output model with suitable example.	5M	CO5	L4
		OR			
11		Given the system $\dot{x}(t) = A\,x(t) + B\,u(t)$, $Y(t) = C\,x(t)$ Where $A=\begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & 1 \\ 0 & 0 & -1 \end{bmatrix}$ $B=\begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$, $C = [1\ 0\ 1]$ Determine the controllability and observability of the system.	10M	CO5	L5

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